

WE CLAIM:

1. A surgical drain comprising:
 - an elongated conduit configured to be implanted in and to drain fluid from a body cavity, the elongated conduit including a first surface located on an outer side of the elongated conduit;
 - a drain portion configured to rest against a substantial length of tissue within the body cavity;
 - a plurality of drain holes spaced along substantially the entire length of the drain portion; and
 - a first sensing system configured to sense a physiological property of tissue proximate to the first surface, the first sensing system including a component that is affixed to the conduit.
2. The surgical drain of claim 1, wherein the component is embedded in the conduit.
3. The surgical drain of claim 1, wherein the component includes a sensor.
4. The surgical drain of claim 1, wherein the component includes an optical fiber.
5. The surgical drain of claim 1, wherein the physiological property sensed is selected from the group comprising: temperature, oxygenation, perfusion, pH, NADH levels, biochemical composition, drug concentration, turgidity or pressure.
6. The surgical drain of claim 1, wherein the first sensing system detects the level of oxygenation of the tissue.
7. The surgical drain of claim 1, wherein the sensing system detects the hemoglobin content in the tissue.
8. The surgical drain of claim 1, further including a transmitting element configured to deliver energy to the tissue proximate to the first surface.

9. The surgical drain of claim 1, comprising a second sensing system configured to detect a physiological property in tissue proximate to the conduit that is different from the physiological property sensed by the first sensing system.

10. The surgical drain of claim 1, wherein the first sensing system is embedded within the conduit behind material that is optically transparent.

11. The surgical drain of claim 1, further including a display configured to depict data corresponding to the physiological property sensed by the first sensing system.

12. The surgical drain of claim 1, wherein the conduit includes a second surface located on an outer side of the conduit and, further including a second sensing system configured to sense the same physiological property of tissue proximate to the second surface.

13. The surgical drain of claim 1, further including a processing system in communication with the first and second sensing system configured compares a difference between the physiological property sensed by the first and second sensing systems.

14. A surgical drain system comprising:

an elongated conduit configured to be implanted in and to drain fluid from a body cavity, the elongated conduit including a first surface located on an outer side of the elongated conduit and a second surface located on an outer side of the elongated conduit;

a first sensing system configured to sense a physiological property of tissue proximate to the first outer surface;

a second sensing system configured to sense the same physiological property of tissue proximate to the second outer surface; and

a processing system in communication with the first and second sensing system that compares a difference between the physiological property sensed by the first and second sensing systems.

15. A method of utilizing a surgical drain to monitor the condition of a tissue in a body cavity, comprising:

implanting a surgical drain within a body cavity in proximity to a tissue to be monitored, wherein the surgical drain includes a first sensing system configured to sense a physiological property of the tissue;

receiving information from the first sensing system regarding a physiological property of the tissue;

monitoring the information received from the first sensing system to evaluate the condition of the tissue over time.

16. The method of claim 15, wherein the tissue condition monitored is selected from the group comprising: perfusion, oxygenation, temperature, pH, NADH level, drug concentration, turgidity and pressure.

17. The method of claim 15, comprising transmitting energy to a tissue, and receiving energy from a tissue with the first sensing system.

18. The method of claim 15, comprising transmitting energy through a tissue, and receiving energy from a tissue with the first sensing system.

19. The method of claim 15, further including processing the information received from the first sensing system.

20. The method of claim 15, further including displaying information received from the first sensing system.

21. The method of claim 15, comprising detecting a lack of receipt of information from the first sensing system.

22. The method of claim 15, comprising detecting a lack of contact between a sensor of a sensing system and the tissue.

23. The method of claim 15, comprising inflating an inflatable chamber associated with the surgical drain to decrease distance between the tissue and the surgical drain.

24. The method of claim 15, comprising applying suction to a lumen within the surgical drain to decrease distance between the tissue and the surgical drain.

25. The method of claim 15, wherein implanting the surgical drain comprises anchoring the surgical drain to a tissue within the body cavity.

26. The method of claim 15, further comprising removing the surgical drain when monitoring is not desired.

27. A surgical drain comprising:

a conduit that is bifurcated into at least two elongated conduits to be implanted in and to drain fluid from a body cavity,

the first elongated conduit including a first surface located on an outer side of the conduit and a second surface located on an outer side of the conduit that is substantially opposite of the first surface;

the second elongated conduit including a third surface located on an outer side of the conduit and a fourth surface located on an outer side of the conduit that is substantially opposite of the first surface;

a first sensing system configured to sense a physiological property of tissue proximate to the first surface; and

a second sensing system configured to sense a physiological property of tissue proximate to the second surface; and

a third sensing system configured to sense a physiological property of tissue proximate to the third surface; and

a fourth sensing system configured to sense a physiological property of tissue proximate to the fourth surface.

28. A surgical drain comprising:

an elongated conduit configured to be implanted in and to drain fluid from a body cavity;

a first transmitting system configured to deliver spectral energy to tissue proximate to the conduit; and

a first sensing system configured to detect spectral energy from the tissue proximate to the conduit.

29. The surgical drain of claim 28, further including a second sensing system configured to sense a physiological property from the tissue proximate to the conduit.

30. The surgical drain of claim 29, wherein the physiological property is selected from the group comprising: oxygenation, perfusion, temperature, pH, NADH levels, biochemical composition, drug concentration, turgidity or pressure.

31. The surgical drain of claim 28, wherein the conduit includes a drain portion configured to rest against a substantial length of tissue within the body cavity and a plurality of drain holes spaced along substantially the entire length of the drain portion.

32. The surgical drain of claim 28, wherein the transmitting element and a portion of the first sensing system are embedded within the conduit behind optically transparent material.

33. The surgical drain of claim 28, further including a display configured to depict data corresponding to the spectral energy detected by the first sensing system.

34. The surgical drain of claim 33, wherein the display is configured to display a color corresponding to the spectral energy detected.

35. The surgical drain of claim 33, wherein the display is configured to display a numerical value corresponding to the spectral energy.

36. The surgical drain of claim 28, further including:

 a second transmitting system configured to deliver spectral energy to a different tissue proximate to the conduit; and

 a second sensing system configured to detect spectral energy from the different tissue proximate to the conduit.

37. The surgical drain of claim 36, further including a processing system in communication with the first and second sensing systems that compares a difference between the spectral energy sensed by the first and second sensing systems.

38. The surgical drain of claim 28, further including:

 a second transmitting system configured to deliver spectral energy to a different location of the same tissue than the first transmitting system; and

 a second sensing system configured to detect spectral energy from the different location of the same tissue.

39. The surgical drain of claim 38, further including a processing system in communication with the first and second sensing systems that compares a difference between the spectral energy sensed by the first and second sensing systems.

40. The surgical drain of claim 28, wherein the first sensing system includes a component that is affixed to the conduit.

41. The surgical drain of claim 28, wherein the component is embedded in the conduit.

42. The surgical drain of claim 28, wherein the component includes a sensor.

43. The surgical drain of claim 28, wherein the component includes an optical fiber.

44. A system comprising:

 an elongated conduit configured to be implanted in and to drain fluid from a body cavity, the elongated conduit including a first outer surface and a second surface;

 a first sensing system configured to detect spectral energy from tissue proximate to the first outer surface;

 a processing system in communication with the first sensing system configured to determine a color value based on the spectral energy; and

a display configured to depict a color representative of tissue proximate to the first outer surface.

45. The system of claim 44, further comprising:

a second sensing system configured to detect spectral energy from tissue proximate to the second outer surface;

a processing system in communication with the second sensing system configured to determine a color value based on the spectral energy; and

a display configured to depict a color representative of the tissue proximate to the second outer surface.

46. The system of claim 45, wherein the processing system is configured to compare a difference between the spectral energy detected by the first sensing system and the second sensing system.

47. The system of claim 44, further including third sensing system configured to sense a physiological parameter different than the first sensing system.

48. The system of claim 47, wherein the physiological property is selected from the group comprising: temperature, pH, NADH levels, biochemical composition, drug concentration, turgidity or pressure.

49. The system of claim 44, further comprising a transmitting element configured to deliver energy to the tissue proximate to the first surface.

50. The system of claim 44, wherein at least portions of the first sensing system and transmitting element are embedded within the conduit behind optically transparent material.

51. The surgical drain of claim 44, wherein the conduit includes a drain portion configured to rest against a substantial length of tissue within the body cavity and comprising a plurality of drain holes spaced along substantially the entire length of the drain portion.

52. The surgical drain of claim 44, wherein the first sensing system includes a component that is affixed to the conduit.

53. The surgical drain of claim 44, wherein the component is embedded in the conduit.

54. The surgical drain of claim 44, wherein the component includes a sensor.

55. The surgical drain of claim 44, wherein the component includes an optical fiber.

56. A system comprising:

an elongated conduit configured to be implanted in and to drain fluid from a body cavity, the elongated conduit including a first outer surface and a second outer surface;

a first sensing system configured to detect spectral energy from tissue proximate to the first outer surface;

a processing system in communication with the first sensing system configured to determine a numerical color value; and

a display configured to depict a numerical color value representative of tissue proximate to the first outer surface.

57. The system of claim 56, further comprising:

a second sensing system configured to detect spectral energy from tissue proximate to the second outer surface;

a processing system in communication with the second sensing system configured to determine a numerical color value based on the spectral energy; and

a display configured to depict a numerical color value representative of the tissue proximate to the second outer surface.

58. The system of claim 56, wherein the processing system is configured to compare a difference between the spectral energy detected by the first sensing system and the second sensing system.

59. The system of claim 56, further including third sensing system configured to sense a physiological parameter different than the first sensing system.

60. The system of claim 59, wherein the physiological property is selected from the group comprising: temperature, pH, NADH levels, biochemical composition, drug concentration, turgidity or pressure.

61. The system of claim 56, further comprising a transmitting element configured to deliver energy to the tissue proximate to the first surface.

62. The system of claim 56, wherein at least portions of the first sensing system and transmitting element are embedded within the conduit behind optically transparent material.

63. The surgical drain of claim 56, wherein the conduit includes a drain portion configured to rest against a substantial length of tissue within the body cavity and comprising a plurality of drain holes spaced along substantially the entire length of the drain portion.

64. The surgical drain of claim 56, wherein the first sensing system includes a component that is affixed to the conduit.

65. The surgical drain of claim 56, wherein the component is embedded in the conduit.

66. The surgical drain of claim 56, wherein the component includes a sensor.

67. The surgical drain of claim 56, wherein the component includes an optical fiber.